

CLAIMS

The following is claimed:

1. An amplifier, comprising:

5 a switching system comprising at least one switching device to selectively provide power to a load according to a quantized output; and

a driver system coupled with the switching system, the driver system receiving a system analog input and providing the quantized output to the switching system, the driver system comprising:

a passive circuit comprising:

10 a quantizer coupled with the switching system, the quantizer providing a quantized output representative of a quantizer input signal, and

15 a passive filter coupled with the quantizer, the passive filter providing the quantizer input signal according to a passive filter input and a feedback signal from the switching system, and

an active filter, the active filter providing the passive filter input according to a difference between a system analog input and the feedback signal and according to a gain factor.

20 2. The amplifier of claim 1, wherein the switching system comprises an h-bridge circuit coupled with the driver system, first and second power supply voltages, and the load, the h-bridge circuit comprising:

a first switching device selectively coupling a first load terminal with the first power supply voltage according to the quantized output;

25 a second switching device selectively coupling the first load terminal with the second power supply voltage according to the quantized output;

a third switching device selectively coupling a second load terminal with the first power supply voltage according to the quantized output; and

a fourth switching device selectively coupling the second load terminal with the second power supply voltage according to the quantized output.

3. The amplifier of claim 2, wherein the switching system further
5 comprises a logic circuit coupled with the driver system and the h-bridge circuit, the logic circuit providing first, second, third, and fourth switching signals to the first, second, third, and fourth switching devices, respectively, according to the quantized output.

10 4. The amplifier of claim 3, wherein the quantized output is a two-level signal having two possible states.

5. The amplifier of claim 4, wherein the logic circuit asserts the first and fourth switching signals when the quantized output is a first state, asserts the
15 second and third switching signals when the quantized output is a second state, and asserts the first and third switching signals, or the second and fourth switching signals, or no switching signals, when the quantized output changes states.

20 6. The amplifier of claim 3, wherein the logic circuit asserts the first and fourth switching signals when the quantized output is a first state, asserts the second and third switching signals when the quantized output is a second state, and asserts the first and third switching signals, or the second and fourth switching signals, or no switching signals, when the quantized output changes
25 states.

7. The amplifier of claim 2, wherein the switching system activates the first and fourth switching devices when the quantized output is a first state, activates the second and third switching devices when the quantized output is a

second state, and activates the first and third switching devices, or the second and fourth switching devices, or no switching devices, when the quantized output changes states.

5 8. The amplifier of claim 2, wherein the quantized output is a two-level signal.

 9. The amplifier of claim 2, wherein the passive and active filters are second order low pass filters.

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 10. The amplifier of claim 9, wherein poles of the active filter are substantially matched with poles of the passive filter.

 11. The amplifier of claim 2, wherein poles of the active filter are
15 substantially matched with poles of the passive filter.

 12. The amplifier of claim 2, wherein the gain factor is about 25 or more.

20 13. The amplifier of claim 12, wherein the gain factor is about 250.

 14. The amplifier of claim 1, wherein the passive and active filters are second order low pass filters.

25 15. The amplifier of claim 14, wherein poles of the active filter are substantially matched with poles of the passive filter.

 16. The amplifier of claim 1, wherein poles of the active filter are substantially matched with poles of the passive filter.

17. The amplifier of claim 1, wherein the gain factor is about 25 or more.

5 18. The amplifier of claim 17, wherein the gain factor is about 250.

19. The amplifier of claim 1, wherein the quantized output is a two-level signal.

10 20. The amplifier of claim 19, wherein the switching system couples a first load terminal with a first power supply voltage and couples a second load terminal with a second power supply voltage when the quantized output is a first state, couples the first load terminal with the second power supply voltage and couples the second load terminal with the first power supply voltage when the
15 quantized output is a second state, and couples the first and second load terminas with one of the first and second power supply voltages, or with neither supply voltage when the quantized output changes states.

21. The amplifier of claim 1, further comprising a digital delta-sigma
20 modulator providing a two-level system analog input to the driver system.

22. An amplifier driver system for providing a quantized output to a load switching system according to a system analog input, the driver system comprising:

25 a passive circuit comprising:

a quantizer providing a quantized output representative of a quantizer input signal, and

a passive filter coupled with the quantizer, the passive filter providing the quantizer input signal according to a passive filter input and a feedback signal; and
an active filter, the active filter providing the passive filter input according
5 to a difference between a system analog input and the feedback signal and according to a gain factor.

23. The amplifier driver system of claim 22, further comprising a digital delta-sigma modulator providing a two-level system analog input to the driver
10 system.

24. The amplifier driver system of claim 22, wherein the quantized output is a two-level signal having two possible states.

15 25. The amplifier driver system of claim 22, wherein the passive and active filters are second order low pass filters.

26. The amplifier driver system of claim 25, wherein poles of the active filter are substantially matched with poles of the passive filter.
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27. The amplifier driver system of claim 22, wherein the gain factor is about 25 or more.

28. The amplifier driver system of claim 22, wherein the gain factor is
25 about 250.

29. An amplifier for driving a load according to a system analog input, the amplifier comprising:
a passive delta-sigma modulator comprising:

a passive filter providing a first filtered signal according to a passive filter input and according to a feedback signal,

a quantizer coupled with the passive filter and providing a quantized output according to the first filtered signal, and

5 a switching system coupled with the the passive filter and the quantizer, the switching system selectively providing power to a load according to the quantized output and providing the feedback signal to the passive filter; and

10 a gain amplifier in a feedback loop around the passive delta-sigma modulator.

30. The amplifier of claim 29, further comprising a second filter in the feedback loop.

15 31. The amplifier of claim 30, wherein the passive filter and the second filter are second order low pass filters.

32. The amplifier of claim 29, further comprising a digital delta-sigma modulator providing a two-level system analog input to the amplifier.

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